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## **Fracture-Proof Flat Clasping Floorboard Strip And the Flooring Assembled with Such Strips**

### **Technical Domain**

This invention involves a type of floorboard strips and the corresponding flooring especially the fracture-proof flat clasping floorboard strips and the flooring assembled with such strips.

### **Background**

Existing wood flooring types include solid wood flooring, solid wood composite flooring, reinforced composite flooring, and bamboo and wood composite flooring etc. Wood flooring has become one of the first choices among consumers because of its natural and elegant designs, easy maintenance and competitive prices. In the end of 1970s, the slot mortise direct locking flooring appeared and it no longer needed the previously complicated installation and leveling procedures. However, this kind of flooring also has its defects: air humidity changes will make the floor expand and shrink and lead to cracks at the board joints; adhesives must be applied to the board joints during installation and the use of adhesives will increase installation costs and cause air pollution; as the upper and lower surface sides of both slot mortise and tenon generally level with each other, the tenon tends to break at its root when the floor is not level enough and either side of the joint is under pressure. As shown in Figure 1, another type of flooring in use today is the rotation fitted clasping flooring invented by Unilin Décor – a company in Belgium – in the 1990s. The invention got its European patent EP1024234 and in 2005 it got its USA Patent 5,516,579. This type of flooring also has its defects. Firstly, its installation is not as easy as the flat clasping type. During the installation, the tenon (100) of a flooring strip must be inserted obliquely into the slot mortise (200) of another strip and then the former strip shall be rotated to a certain degree to make the tenon (100) locked in the slot mortise (200). This oblique insertion installation is complicated and easy to cause damages to tenons and slot mortises. Secondly, during installation the upper side of a tenon must be strictly aligned to that of the slot mortise. Otherwise the installation would be impossible. In this case, only professional workers can complete the installation, as there are strict requirements on installation. Thirdly, as the flooring is designed in clasping structure, damages may easily happen to the clasping structure of the short sides during installation and affect the quality of the installed flooring.

### **Invention Content**

Objective of the invention: Existing flooring techniques have the following defects - air humidity changes will make the floor expand and shrink and lead to cracks at the board joints; adhesives must be applied to the board joints during installation and the use of adhesives will increase installation costs and cause air pollution; as for USA Patent 5,516,579, as the upper and lower surface sides of both slot mortise and tenon generally level with each other, the tenon tends to break at its root when the floor is not level enough and either side of the joint is under pressure. So the objective of this invention is to provide a type of fracture-proof flat clasping floorboard strips and the flooring assembled with such strips.

In order to achieve the above objective, this invention provides a type of fracture-proof flat clasping floorboard piece. The piece is in a long strip shape. Along the long side and the short side of such strip, there is slot mortise on one end and tenon on the other end. The slot mortise has a long side surface and a short side surface along its upper and lower sides. The upper surface of the slot mortise is parallel to and has the same height with the upper surface of the tenon. In the lower surface of the slot mortise there is a V-shaped groove while a convexity is arranged on the lower surface of the tenon. The convexity extends towards the insertion direction of the tenon and has an anti-self-locking oblique plane in its front end. The

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oblique plane forms Angle No.1 with the upper surface of the strip. The Angle varies between 15-35°. A corresponding oblique plane is arranged on the external surface of the long end of the slot mortise's lower side in order to fit the anti-self-locking oblique plane. The rear end of the convexity fits perfectly with the external side surface of the V-shaped groove and forms a self-locking plane, which forms Angle No. 2 with the upper surface of the strip. Angle No. 2 varies between 30-70°. The external shape of the tenon corresponds with that of the slot mortise.

Normally, the side wall of the long end of the slot mortise is 2-4mm longer than that of its short end.

In order to achieve the above objective, this invention also provides the flooring assembled with the above-mentioned fracture-proof flat clasping floorboard strips. Such flooring includes a number of strips which are assembled together with the tenon in one strip inserted into the slot mortise in another and form the floor surface.

The merits of such flooring include: the floorboard strips have simple and beautiful structure and are easy to manufacture and install and can effectively prevent damages from happening during installation; no adhesive is needed to connect the strips during installation and the assembled flooring is safe and environment-friendly and has a long service life.

#### Attached Drawings

Figure 1 Structure of Flooring A

Figure 2 Profile of This New-Type Floorboard Strip

Figure 3 Structure of the Assembled New-Type Flooring

Figure 4 Assembling of the New-Type Flooring

In the figures:

1. strip body, 11. slot mortise, 12. tenon, 100. tenon of existing types of flooring strips, 111. short end of the slot mortise, 112. long end of the slot mortise, 113. upper surface of the slot mortise, 114. lower surface of the slot mortise, 115. V-shaped groove, 116. oblique plane, 117. oblique plane on the external surface of V-shaped groove, 121. upper surface of the tenon, 122. lower surface of the tenon, 123. convexity in the lower surface of the tenon, 124. anti-self-locking oblique plane, 125. rear oblique plane of the convexity in the lower surface of the tenon, 200. slot mortise of existing types of flooring strips, 300. cushion block, 400. rubber hammer,  $\alpha$ . Angle No. 1,  $\beta$ . Angle No. 2, P. upper surface of the strip

#### Technical Details

Figures 2-4 shows the technical details of this invention without any reservations. Now, on the basis of Figures 2-4, we provide a detailed description of the techniques of this invention.

As shown in Figure 2, the invention provides B – a type of fracture-proof flat clasping floorboard piece. The piece is in a long strip shape. Slot mortise 11 is arranged along the long side of strip body 1 and tenon 12 along the other side. There are short end 111 and long end 112 respectively on the upper and the lower sides of the slot mortise 11. The upper surface 113 of the slot mortise is parallel to and has the same height with the upper surface 121 of the tenon. In the lower surface 114 of the slot mortise 11 there is a V-shaped groove 115, while a convexity 123 is correspondingly arranged on the lower surface 122 of the tenon. Along the insertion direction of tenon 12, an anti-self-locking oblique plane 124 is arranged on the front end of the convexity. The plane forms Angle  $\alpha$  with P - the upper surface of the strip. Normally, Angle  $\alpha$

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can vary between 15-35°. A corresponding oblique plane 116 is arranged on the external surface of the long end 112 of the slot mortise to fit the angle of the anti-self-locking oblique plane 124. The rear surface 125 of the convexity in the tenon fits perfectly with the external oblique plane 117 of the V-shaped groove in the slot mortise and forms a self-locking oblique plane. The self-locking oblique planes 125 and 117 form Angle  $\beta$  with P - the upper surface of the strip. Normally, Angle  $\beta$  can vary between 30-70°. The external shape of the tenon 12 corresponds with that of the slot mortise 11 in order to make the assembled flooring firmer. For the purpose of easy installation, the long end 112 of the slot mortise is usually 2-4mm longer than its short end.

At the same time, slot mortise and tenon are also arranged in both ends along the short side of strip B. Their shapes and structures are identical to those along the long side.

As shown in Figure 3, this invention also provides a fracture-proof flat clasping flooring assembled with the above-mentioned B strips. The flooring includes a number of B strips which are assembled together with the tenon 12 in one strip inserted into the slot mortise 11 in another and form the floor surface.

As shown in Figure 4, cushion block 300 and rubber hammer 400 are used in the installation process in order to prevent damages from happening to B strips and affecting the quality of the assembled flooring. First, fix one strip B, then insert the tenon 12 of the other strip B' into the slot mortise 11 of the already fixed strip B. Cushion block 300 props up the brim of the unfixed strip B'. Same as the brim part of strip B', the cushion block 300 also has its long end and short end, which respectively prop up the short end and the long end of strip B' to facilitate the installation. As shown in Figure 2, the lower surface 122 of the tenon is an oblique plane. When tenon 12 just enters slot mortise 11, the lower surface 122 of the tenon passes the oblique plane 116 on the external surface of the long end 112 of the slot mortise 11 and the anti-self-locking oblique plane 124 of the convexity 123 on the lower surface of the tenon comes close to the oblique plane 116 and the upper surface 121 of the tenon enters 1-2mm onto the upper surface 113 of the slot mortise. Now, use rubber hammer 400 to strike the outer side of cushion block 300 and make the convexity 123 on the lower surface of the tenon inserted into the V-shaped groove 115 of the slot mortise and make the rear end surface 125 of the convexity 123 fit perfectly with the external oblique plane 117 of the V-shaped groove. Thus, the self-locking oblique planes are joined closely and make the two strips clasped together and tenon 12 is completely inserted into the slot mortise. Likewise, all other strips can be assembled and finally form the flooring.

Identical tenons and slot mortises are arranged on both long and short sides of strip B. So the structure offers many options for strip combination patterns. Strips can be joined between their long sides as well as between their short sides and between a long side and a short side so as to form different flooring patterns.

The flooring strips provided in this invention have simple structure and are easy to manufacture. The method of flat clasping is employed in the assembly process and the use of cushion blocks can effectively prevent damages from happening in installation. The arrangement of anti-self-locking and self-locking oblique planes gives a firm structure to the assembled flooring. No adhesive is needed to connect the strips during installation and the flooring is safe and environment-friendly. The installed flooring looks good and has a long service life and has overcome many defects of existing types of flooring.